5

do they produce even the least oscillation.

2 If the lungs of a dead animal be filled with air, and a pressure afterwards made upon the thorax, a sound is emitted from the glottis, not unlike that which was natural to the same animal in its living state. Now no one can suppose the organs of the voice to be in a tense state in a dead animal.

3 If the voice depended upon exciting tremulous motions upon tense cords, the larynx which is composed of so many cartilages & ligaments, all liable to be drawn into a state of exquisite and acute tension by the action of the numerous muscles which move them, must be spirited

in his inaug. Dissertation

to its formation, but Dr Fox has proved by an actual experiment upon a pig, that the Larynx may be removed from the throat, and yet a sound nearly natural will be afterwards discharged thro' the glottis. —

4 If a piece of wax be applied to the sides of the glottis, it does not change the voice — but the application of a piece of Wax to a Violin takes away its power of emitting but sound & vibration.

4 If sound depended upon cords, then the more tense the cord, the more acute would be the sound, — and the stronger the person who emitted the sound, the more tense of course would

be the cords of his organs of Speech, - at this rate, men who possess more strength than Women, and who are capable of giving most tone to the organs of Speech, would have more acute voices than Women - but the reverse of this is universally known to be the case. — The Ursula contributes much to the formation of the voice, & yet we know it possesses no passion analogous to a musical sound. In blowing the nose, we observe the sound produced, to be in proportion to the greater or less velocity of the air thro the nostrils, & their greater or less aperture, now no one can suppose the nostrils to have the least resemblance in their structure or uses to a corded

instrument. —

Is the resemblance of the organs which form the voice to sundry wind instruments of music, ~~a strong presumption~~ affords a strong presumption that sound in both of them depends upon the same cause.

Is sound increased in its strength by the size of the passage thro which air passes in a wind instrument? so it is — in the organs which compose the voice. Is sound increased by the solidity, or tension of bodies thro which it passes? so it is in the organs which compose the voice? — Is sound increased by reverberation as in the Conque Shell? So is the

Voice; - the [illegible] Larynx - the Pharynx - the mouth and the nose all [illegible] to answer this purpose. - So [illegible] varied by certain inner passages in the instruments thro' which it passes. So is the Voice, - [illegible] So [illegible] varied by the number and difference of passages in the instruments thro' which it passes? So is the Voice. - It is most powerful, when it passes thro' the Glottis, mouth & nose in their greatest State of extension. - So the [illegible] degree of sound in any case proportioned to the quantity of Air in a Wind instrument which produces it. So is sound. This appears in a more especial

manner in Birds who tho' small, ~~[illegible]~~ emit sounds which are far greater than the sounds emitted by many animals of a larger size; now Birds we said formerly contain reservoirs of air not only in their lungs, but in little cells which are connected with them, as also in their very bones and all of feathers, which they employ, not only in Respiration, but in singing. There is another circumstance peculiar to the organs which compose the voice of Birds which deserves to be noticed. Their Wind pipe is divided by means of a double glottis - the one which is membranous is placed in the bottom of the trachea - the other which is cartilaginous - in the upper part of the larynx.

v A 4th argument in favor of the Voice being formed upon the principles of a wind instrument is, that not only the human voice but human Speech may be imitated by an echo; now this we know is produced by the reverberation of Sound only, & is no ways influenced by any thing analagous to a chord.

An 8th Arg[t] in favor of this opinion is derived from the influence of certain diseases upon the voice. an abscess in the frontal Sinus in particular, has been known to under the Voice dull - nor could it be cured till the matter of this abscess was discharged. -

This structure is happily calculated to 189.
~~[illegible] [illegible]~~ produce ~~[illegible]~~ a reverberation in
sound, and to supply the Absence ~~of~~
those ~~[illegible]~~ sounding bodies which are to be
met with in the heads of men, and
many other Animals.

// Having mentioned the arguments
which render it probable that ~~[illegible]~~ the Voice
is produced by the discharge of Air thro the
Glottis, I go on to remark the Variety
of tones which ~~[illegible]~~ are observable in
the Voice depends wholly upon the Variety
of motions in the Glottis. — M^r Dodart
in the memoirs of the Royal Academy of
Sciences computes these motions to a=
=mount to 9632. — This number would be
incredible did we not know that the
ear has in some cases been so far

refined by music as to be capable of distinguishing such an immense variety of sounds may serve to illustrate as Mr Dodarts calculation. Musicians divide time into what they call a Batuta quadrata or the largest touch which is the 1/15 part of a minute. This portion of time, they again divide into four equal parts, each of which they subdivide into sixteen parts, so that at last four seconds of a minute are divided into sixty four parts, and the whole minute of time into 960 parts. How Skilful musicians know how to turn this the 64 parts of the 1/15 portion of a minute so exactly, that they are able to distinguish each particle of the time that has been

Sounds are acute & grave according to the greater or less contraction, or expansion, elongation or shortening of the glottis. In uttering of acute and grave sounds, the =

mentioned, every one of which is produced by a different action in the muscles which move the glottis. But the number & celerity of the motions of the glottis in emitting sound go far beyond this observation in instance of acute and perception.

Sounds are divided into acute and grave, and into strong and weak.

~~The acute Sounds are produced by acute~~
~~grave according to the greater or lesser elongation~~
~~the contraction of the glottis or the opening~~
~~or shortening of the glottis. In~~ altering acute and grave Sounds, the

Voice is sometimes lost — this depends in the case of acute sounds upon the glottis contracting so closely as to confine the sound altogether — In the case of grave sounds it depends upon the glottis expanding

so wide, as to leave no rising between the lips of the glottis, and the Larynx - by which means no collision is given to the air in its passage into the mouth.

Sounds are strong and weak according to the strength of the lungs, and the force with which Air is expelled thro' the glottis. — Hence it is weak in children and in old people. Hence probably the reason why it is weaker in Women than in men. — Tho' some Physiologists suppose the glottis to be more contracted in them. —

Whispering is produced by an expulsion of the air from the trachea so weak as to produce no

The trachea is elongated & shortned with the greater or less length of the tones &c. The exercise of the trachea, & glottis in singing are more fatiguing than in speech. In singing case, the peritoneum is very much protruded, & relaxed, & hence the frequency of ruptures and of fat bellies among the women who are great singers in Catholic Countries.

of these tremors in the Larynx - Bones of the mouth - nose - and head which produce a distinct Voice. These tremors are perceptable by placing the hand on the head of a person who is speaking with a distinct voice, but they are wholly imperceptable if he speaks only in a whisper. —

Singing is the protraction of the Voice. The tremors produced by singing are so great as to be diffused thro the whole body, - so much so that persons of nice perceptions have declared that they have felt them in the bones of the extremities. —

The Voice changes in men at

V It is likewise varied by the Weather. The notes of the nightingale are always sweetest in the month of may. The human voice feels the influence of the Vernal Sun, tho' in a less degree. It is varied by pain, & different pains by different cries. — ~~[illegible]~~ 2 + ~~[illegible]~~ voice is in part imitative — hence we find men of the same country & family have frequently the same kind of Voices. There is a case upon record by a german author of the Name of Shelhammer ~~[illegible]~~ of a boy who by being brot up among Swine contracted their Voice so exactly in Squealing, that it could with difficulty be distinguished from it. The citizens of the different States of America may all be distinguished by a sameness & peculiarity of voice.

In order to the voice being clear the passage of the air thro' the nose should be easy & perfect. when ~~[illegible]~~

at puberty magnitude &c
~~[illegible]~~ from an increase of strength
~~[illegible]~~ at that period of life ~~in~~
Larynx
the ~~[illegible]~~. ——— The
of the forehead & nose
bones which assist in the formation of the
Voice likewise suddenly enlarge ~~[illegible]~~ at
the age of puberty. ~~[illegible]~~ The suddenness, and
inequality of the growth of the body at this
period, I shall say hereafter is a source
of many diseases. ———

The Voice is much varied by the
passions. - It is ~~[illegible]~~ and strong in anger -
- weak and plaintive in distress - soft in
love & slow in supplication - all these
changes are produced by a difference in the
or action
contraction of the glottis. ✱[2] ———

✱ The recurrent nerves is essential
to the formation of the Voice. By
dividing it, the Voice is ~~destroyed~~. a weakness

the nose is Obstructed, we are said to speak
thro it. The reverse of this is true. we do not
Speak thro the nose. # see below

~~x ~~But~~ In explaining the Nature & cause
of Voice I must not forget to mention
that there ~~are~~ is said to be men who speak
from their Stomachs instead of their
Lungs. They are called Ventriloqui. This is a deception. the Voice~~

The modifications of the Voice depend
on the size of the glottis ~~[illegible]~~
~~[illegible]~~, & the length of the Trachea. =
~~[illegible]~~

= The Voice is stronger in a standing
than in a sitting posture. this is so much
the case that it may be perceived in
a Congregation when they rise to ~~[illegible]~~
sing the doxology. § It is improved by certain + diseases, viz Delirium — from morb. excitem.
§ It is weakened by eating a full meal,
from the Stomach pressing up the ~~[illegible]~~ thorax, &
lessening their Capacity for air out of which the
voice is formed. # I cannot conclude this Art.

or paralysis of this nerve is probably the most frequent cause of Paraphonia - & Aphonia as we shall say hereafter. —

Thus far have I endeavoured to account for the Voice. But in considering the functions of the human body our inquiries must not stop here. — A voice alone would give man no preeminence above many other animals. It is by the division of this voice by means of many thousand motions into what is called Speech that man acquires a rank in the Scale of being more singular and unequivocal than that which he derives from his Reason, for in the exercise of this operation of the Mind many Animals have approached very

of the Voice without taking notice of the provision made to prevent its excess injuring the Lungs or Brain; and that is the Thyroid Gland. By opening its arteries it prevents the rupture of the larynx & an undue quantity of blood being sent to the brain when we hollow, or speak very loud or for a great length of time. — That this is the case #

V 1: That there can be no Speech, where there is no Respiration, & when it is not voluntary.

2: Speech is formed principally as far as the Trachea & Larynx contribute to it, by the Glottis.

If the Larynx be cut below the Glottis — there will be neither Voice nor Speech — If above, the Glottis, there will voice, but no Speech,

is rendered more certain by those Animals which have no Voice having no Thyroid gland. This Mr. Hunter says is the case in the Whale — but Cuvier says — is not so in the Dolphin & Seal. formerly = Blumenbach comp: Anat: p: 278. trans ver

man him, but in the exercise of Speech he stands alone. - I exclude here the tones which certain birds have been taught to utter from my ideas of Speech. - They are wholly unconnected with ideas, and are as truly mechanical as any of the antic motions which have been taught to dumb animals.

I begin my ~~account of~~ Speech by remarking that it is wholly imitative and that if children were not taught a language of some kind, they would be forced to convey their ideas like brute animals, entirely by dumb signs or inarticulate sounds.

However simple the function of Speech may appear, it is acquired with

~~Dr Cox~~ supposed the thyroid gland served the further purpose of arresting the impetus of the blood to the brain, and thereby of ~~[illegible]~~ preventing of cephalic diseases, ~~[illegible]~~ This opinion was founded upon an experiments made
see below

V These organs are the Larynx - glottis - throat - palate - uvula - mouth - tongue - teeth - lips and nose. Several of these parts are prepared for their respective offices by being supplied by certain nervious carcisco.

by M^r Cooper who found that dog became diseased from the loss of this gland. ~~[illegible]~~ there must have been some mistake in this experiment, for in many persons in whom this gland has been discased there has been no diminution of intellect, nor any other disease of the brain. I believe it to be ~~[illegible]~~ lese is principally

immense difficulty - seldom in less than 15 or 18 months. I have known three instances in this city of its not having been acquired before the 8th year of life. —

In delivering the proofs by which children learn to speak, I shall confine myself to facts which have been the result of observations, made chiefly in my own family —

I. under the organs of Speech sufficiently movable so as to enable them to pronounce the infinite variety of words which compose a language, it is necessary that they should be exercised regularly for that purpose.

This exercise happens in the Glottis & extends to the Larynx & ends in the

to prevent the rupture of the larynx
in loud singing & speaking. It probably
the further use of
serves, to assist ~~in~~ sensation, in
hysterical women and fears to protect
the brain. but of this more hereafter.

return to p 194 V

~~Lips~~ Larynx &
The Glottis are exercised by crying. This
because the sight of pain
found so unwelcome to parents, is wisely
sent to set the muscles of the Larynx
& glottis in motion, as well as to procure
relief from distrip. — I think I have
observed in one instance the effects of
this motion upon speech, — for the
worst child I ever knew spoke dis-
-tinctly before it was 18 months old.

2 The Larynx & glottis are exercised by
Laughing — This begins early in life,
and is attended according to its degree,
with very different dilatations, and
contractions of the Glottis. Perhaps the
another
principal reason why Crying & Laughing are peculiar
in the human species is to learn the acquisition of speech.
3 Crowing — This exercise generally
begins about the 5th month. It is

further ... coughing –

V See here again – the uses of ~~Coughing~~ Coughing &c – Besides promoting Respir[n] &c by its means Animal life, they are necessary to the production of Speech!

a slow ~~inspiration~~ ~~expulsion~~ expulsion of the air thro' the lungs attended with the sound of oe - oe - oe - oe. It is to parents generally a very pleasing sound.

The ~~muscles of the~~ tongue are exercised about the 7th or 8th month. Its first sounds are generally dad, - dad, - dad; - hence the origin of the epithet Daddy - It is assumed ~~[illegible]~~ as the first salutation of a child to its father. Take notice here the lips are not exercised in pronouncing this word.

The muscles of the lips begin to be exercised about the 9th or 10th month by uttering the sounds of pap - pap - pap - mam - mam - mam - mam - hence the origin of the epithets - Papa - & mama. - It is remarkable ~~that~~ in most of the languages we are acquainted with, parents are called by

✓ Sometimes children exercise their lips by playing ~~them~~ on them, or blowing wind thro' them {in the following manner. [Here shew both]

+ Their very name is derived from the latin ~~word~~ Vox, ~~[illegible]~~ voice – to denote their preeminence in language. to be such as that they are a part of the voice, preparitory to Speech. Consonants are the flesh & muscles of languages, They are all ~~#~~ to be below

~~The~~ Further preparation of Children to acquire Speech is further assisted by the growth of the fore teeth, which are generally formed before they are 18 months old, & which in every period of life are useful in the formation of Speech.

~~#~~ soft & agreeable in proportion as they abound in vowels. ~~[illegible]~~

The Greek & Italian are the most agreeable languages ~~[illegible]~~ in the world to the ear upon this Account. The German – Swedish, Danish & English are the least so from their abounding with consonants. ~~[illegible]~~

Names of which have some Lingual - or labial letters in them - as in English, Dadda - Papa - mama & in French - father - mother - Pere - mere - Pater in Latin - Fader & moder in German - madre - padre in Spanish - And Foochin - father - & moochin mother in the Chinese language! By the constant exercise of the muscles which move ye glottis - Larynx - tongue & lips - in this way, for 18 months or two years, Child-ren are prepared to acquire the know-ledge of a language or of articulate sounds. - It is remarkable that in all the inarticulate sounds which I have mentioned, we find some of the Vowels - for these are the Skeleton of all languages -

Language or words like Speech are acquired by Children likewise only by imitation. The ear and the eye are the avenues thro' which the Use of Speech is conveyed

R — There is one of the consonants which has been distinguished above all others not only upon the ear but by its ungrateful effects upon the whole body & that is the letter R. —

Salzman relates a story of a German of the name of Kersting who was taught the letters of the alphabet by placing his hand upon his wife's mouth & discovering the exact motions of which accompanied her pronouncing every letter. upon her pronouncing the letter R — a sense of horror attended with shuddering, pervaded his whole frame. It would seem as if there existed a natural Antipathy to this letter in the human ear — hence it seldom occurs in the languages of the Indians nor of the Africans. From the latter, the white inhabitants of Countries in which negro slavery exists have learned to leave out the letter R

to them. —

After children have brought forward as it were their little organs of speech to their parents' completely supplied by the exercises I have mentioned, they endeavour to imitate them in the pronunciation of single words. These words are always at first substantive nouns. — In their first attempts they make many mistakes. The sounds or words they utter are often as widely different as they can be from the words they are desired to utter. But this little error informs them of their mistakes and they attempt to correct them. — This I suppose affords them exquisite delight, and if they repeat the word

in most of the English words in which it occurs. Hence we hear the words Summer - Winter - Paper - Dinner - Supper - Fear & fire pronounced Summa - Winta - Papa - Dinna - Suppa - Fear and Fire - by persons of the first rank in those countries. A kind of Rhotacism seems to have crept into their language. =

go back to Op200 opposite side.

they hit upon, half a dozen times, they seldom forget it - but if they do not, they often lose it - and sometimes do not recover it for two or three months. - If children can make you understand what they mean, when they call any thing by a false name, they will seldom take much pains to correct it. - I have known a child call a chariot a tarr - & sugar, Billy - long after he could pronounce half the words in our language merely because his parents consented to know what he meant by them.

In acquiring a language, Children are much assisted by looking the persons in the face who speak to them. - They acquire in this way ~~a much~~ [illegible] the pronunciation

They likewise acquire words much soo=
=ner, when they are sung to them than
when they are only spoken - and for this reason, ' caeteris
dwell longer upon the ears, and being accom=
=panied with pleasure, more pains are
taken to retain them. It has been said that
ideas were originally conveyed in musical
tones, and that language has lost its tones by
the habits & pleasures of civilized life. It is
certain all Savages are fond of music, that
they express their passions in musical tones, &
that even their voices are
tinged with them - Their tones moreover are not only simple, but ex=
=tremely plaintive & melancholy - a proof
among an hundred others that might be
mentioned, that they are every where & uniformly
miserable. To return -

of all those words which are spoken by the motion of the lips. + [of this more presently]

The pronunciation of a child is seldom correct at first — even where the utmost pains have been taken by parents to prevent them being spoken to in a childish manner. — Those words in our language which have th: the letter h — connected in them as this - that the th are always learned with a great deal of difficulty. Foreigners seldom pronounce them perfectly.

Speech is not only acquired by imitation, but its peculiarities are influenced by it - hence whole communities - families - & Schools have been remarked to speak alike. These peculiarities are acquired chiefly under 12 years of

I will illustrate what I mean by each of those distinctions of sounds in different languages. A. and O. produce gutteral ~~letters~~.
B and P produce labial ~~letters~~. C and S. ~~are~~ dental ~~letters~~ L and R ~~are~~ lingual ~~letters~~
and M & N ~~are~~ nasal ~~letters~~ sounds.

age. After that period the muscles of the organs of Speech are less easily moved affected by imitation. I exclude here those peculiarities of Speech which are acquired by affectation. These are picked up at every period of life.

Languages differ from each other in the different proportions of words which are uttered by the throat - tongue teeth lips those exclusive of each other. Hence languages are called guttural - lingual - Dental labial and nasal according as the throat tongue or lips predominate in each of them. The following letters of the alphabet

Indolence has a great influence upon Speech. Hence we find the finest muscles employed in the languages of Savages who are all indolent. The

† In the pronunciation of Consonants
the Uvula - the palate - cavity of the nose - tongue -
teeth - lips - are all employed. - The Hebrews
early observed this, and have divided
their consonants acording as they employed
these different parts into guttural -
palatine - Dental - labial & nasal.

Indians in this country use their tongues and lips as little as possible in conversation. Even at public treaties, they grant their assent to what is proposed to them this their threats. all their languages partake largely of gutteral sounds. Indolence has the same effect upon the languages of civilized nations. The plethora of Vowels (If I may be allowed the expression) which composes the Italian language seems to have arisen from that cause - for fewer muscles are employed in pronouncing words that abound with Vowels than Consonants.

The Arabians who are indolent from climate & government, use their tongues only,

+ The same as in expressing the emotion of pity.

~~Rapidity~~ of Speech is much influenced by facility in hearing, & quickness of perception. — Old men speak slow — because they hear imperfectly. — It is likewise influenced by the greater or less velocity of the circulation of the blood. It is rapid in a fever of great morbid action, also in anger, and it is slow in a fever in which the circulation is feeble as in the typhus, & also in a depressed state of the mind. By attending to this remark we may know the state of a patient's circulation only by hearing him speak, before we feel his pulse.

in an affirmative } in a peculiar species
of intonation + [describe it] +

Some of our fellow citizens Gent.
(but I shall not ~~say to whom~~ mention the States to which they belong,
use an affirmative that is attend with nearly
as little trouble - by throwing the voice
against the roof of the mouth, and
thro' the nose — [describe it] +

Thus - have I described the
origin - formation - & variety of Speech
among men. That the Acct. I have
given you is a just one, I infer
from the success which attended the
attempts that have been made to
teach the deaf to speak. It was
first discovered by a Spanish monk of the name of Portius
and after being improved by

persons dumb, but M^r Sicard remarks it would be more proper to call them silent.

To teach them to understand what is said to them. This has been done, by teaching ~~the persons who are dumb~~ the silent, to observe the exact motions of the Lavyer and Lips in the persons who speak to them, each of which have precise motions for every word they utter. In this way com-

several other persons (as 207) refuted by Amman
a Dutchman - a contemporary of Dr.
Boerhaave's - and has since been
adopted, [illegible] by a Mr Braidwood of Edinr and by
[illegible] whose [illegible] you will find in
the Encyclopedia. [illegible] It has likewise
[illegible] been adopted
& described by M. Sicard - of France.
To understand the nature of this
useful Art, it will be necessary to
remark that in most of dumb persons
who are likewise deaf,
there is no defect in the Organs
of Speech. They do not speak only because
they cannot hear, - and hearing is
the sense thro' which Speech is
chiefly acquired. — It is common to call such
The first thing done in teaching
the dumb to speak, [illegible]

of which

V After they have been taught to under-
-stand what is said to them by Signs is to supple

The Scholars is then
11 directed to place his
hands upon the Larynx of his Mas-
-ter, and to observe the exact tremor
or motions which accompany each
word the letters, which letters and words are written
down, in order to be committed to
memory by him. The master
then directs him to take the same notice of the
motions of his lips in speaking ... After
having previously discovered the exact

≠ B: - he would direct him to shut
his lips, and at the same time to expel
the air forcibly from the lungs - or suppose
he should direct him to pronounce the word
paper 11

~~[struck out]~~ 20 ~~[struck out]~~ air

the Larynx, & to teach them to expel ~~[struck out]~~

thro' it so as to excite an inarticulate

Sound. The Larynx is supplied by frequent-

-ly pressing it. ~~[struck out]~~

~~[struck out]~~ motions ne:

it is ~~[struck out]~~ necessary to give the tongue

& lips in every word in a language,

~~[struck out]~~ the master ~~[struck out]~~ now directs ~~[struck out]~~

his Scholar ~~to~~ make those motions in the instant

of their expulsion of the Air from the

lungs. — E. G: Suppose he ~~[struck out]~~ wished

~~[struck out]~~ him to pronounce the ~~[struck out]~~ letter t

"t" he ~~[struck out]~~ would order him ~~first~~ to

expel the Air from his lungs two

different times in a quick Succession.

During the first time — ~~they~~ he would tell

him to thrust his tongue against

the teeth of his lower Jaw, & to ~~[struck out]~~

In this way Dr Thaller tells us Amerman taught a boy to speak and read - and wrote in one month. and a Girl in two months, but in general, it required a whole year to complete the education of a Deaf or silent person in the manner I have mentioned.

But Amerman not only taught the Deaf to speak, but from his accurate knowledge of all the motives in the organs of Speech which take place in the pronunciation of words, he corrected false or bad pronunciation. For example he directed a boy who used the letter (t) and (d) instead of (k) to depress the tongue with his fingers in order to prevent its striking the upper teeth. After a while he was able to depress his tongue at his will acquired over it.

close his lips together at the same instant – this would produce the syllable pa – During the 2nd time he expelled the air from his lungs, suppose the master should tell him to raise the tip of his tongue towards the roof of his mouth and at the same instant to close his lips – the syllable uttered would be – per – which connected with pa – would be paper. – V –

By attending to this process I cured a little boy of using W for V in the word Vinegar & veal – agreeably to the vulgar mode of speaking which is practised by some of the Citizens of the [illegible] – I directed him to press the teeth of his upper jaw upon

V Some words
are imperfectly pronounced from the ligament
of the tongue ~~being too long~~ not being
cut in early life. I have in several in-
-stances cured these imperfections of speech
by cutting this ligament where it has
been of a preternatural length.

Speech is impaired not only by the loss of
the foreteeth, but by their preternatural size,
and projecting in clusters instead of rows from
growing in
the the upper & lower jaws. This defect in
speech has been corrected by removing some of
the teeth, or opening moderate apertures
between them, or reducing their length by
means of a file.

his lower lip every time he
attempted to pronounce those words.
— They came forth as soon as he did this,
with their proper Sound
to his great astonishment & delight.

V Dumb or Silent Persons who have been taught
to speak in the manner I have descri-
bed, are frequently able to hold a conversation
Observing the motions
only by of the Lips of the persons with whom
they converse. — Amman
repeat what he said,
taught a man to only by
directing him to move his lips as
he moved his, and at the same time
to expel air from his lungs &c
to hear with his eyes,
taught a boy so perfectly in this
(if I may be allowed the expression)
way, that he could take down

It is recorded

~~[illegible]~~ of

Shaw Boerhaave, the nephew of the

celebrated Dr Boerhaave that he ~~[illegible]~~ received

impressions upon his ears thro'

the medium of his hands & feet.

This was a translation of a sense,

of which I shall speak more

fully hereafter. —

in writing a sermon, and afterwards read it word for word to his friends when he went home. The Acuteness of perception in the eyes in these cases goes almost beyond conception. It is possible they may perceive & distinguish some of those tremors before spoken which are communicated to the head in speaking, for each word I have no doubt has its peculiar and specific tremor or vibration. Should this be the case, it would not argue more acute sight, - that was discovered bearing in the two Duttons in the sense of whose history you will find in the Lectures upon Animal life. V

I shall have occasion to

In explaining the nature of Speech, I must not omit to mention that are men called Ventriloqui who are said to speak from their Stomachs. This is altogether a deception. The Speech is formed by the inspiration instead of the expiration of Air, and the Voice & Speech are in the lungs & not in the Stomach. I shall resume this Subject when I come to treat of Sound.

In reviewing the wonderful Gift & exercise of Speech, it is impossible not to be struck with the rapidity & facility of those motions in the Larynx Glottis - tongue - & lips by which it is performed. The English language consists of more than 40,000 words, nearly every one of which is uttered by motions in the above Organs different

resume this subject when we come to ~~[illegible]~~ mention the ~~[illegible]~~ cases of morbid voice and Speech in our pathology - when I shall explain some matters which ~~[illegible]~~ would be foreign to a lecture on Physiology.

~~It~~ remains only that I mention the use of Speech. ~~But~~ here Gent. I am ~~[illegible]~~ at a loss what to say than what ~~to leave~~ unsaid. I shall ~~[illegible]~~ only observe that by Speech man is enabled ~~Brutes are stationary in their knowledge in part, because~~ above all the creatures in the World. - It ~~was~~ by means of Speech that the venerable Sage instructed ~~the~~ his Children before they have the Speech.

the invention of writing & printing - - By the use of this function we carry on ~~the~~ business of the world - ~~a~~ It is the instrument ~~of~~ by which knowledge is

from each other. This will not be incredible to you when you recollect the number & exibity of sounds which I mentioned at our last lecture, and which are distinctly perceived by a good musical ear. — But our wonder should not cease here. We meet with persons who speak, with the latin & Greek most of the modern languages of Europe. The distinct motions in the organs of Speech of these persons probably amount to many hundred thousand, & are all at the same time so perfectly correct as to convey in an instant precise ideas to the persons who understand them. I beg you would remember these facts. I shall have occasion to apply them, when I come to treat of the nature & opperations of the human mind.

chiefly conveyed from man to man - It is the ~~vehicle~~ vehicle of eloquence - of friendship - and love. - ~~as~~ But above all - it is the one of the means by which we may more commanded are permitted to address the great father of the Universe, and to celebrate his works among the children of men.

⊙ ✱ Mr Boyle ~~was~~ we are told made it a practice always to ~~make a short~~ pause in conversation when he mentioned the name of the Supreme Being - Did we contemplate fully all that is known of the wonderful manner in which the voice and speech are formed, we should go beyond Mr Boyle in our homage to the Deity. - ~~as~~ Every time we utter a word, that conveyed an idea to a friend, or to the public, we should

remains now ~~to~~ I mention the
uses of Speech. By it, man is ennobled
above all the creatures in the world.
Brutes are stationary in their knowledge
chiefly because they are ~~denied~~ destitute
of this precious gift of heaven. Where
there is no Speech there can be but few
ideas, for words are said to be the signs
of ideas. They are the vehicles
of ideas, and without them ideas soon
perish in the mind. ~~Without Speech~~

I shall only add that this precious
discriminating characteristic of man, has been supposed
to be the result of the gradual & successive
operations of human reason. I cannot
assent to this opinion. Had Speech depended
upon this cause, I believe at this day we

pause to admire the infinite wisdom ~~which~~ which is displayed by the divine architect in the structure of these organs by which that word was pronounced.

Let 9th go on to p 216

I have not yet lost sight of the human figure whom I fancied I first met with on a visit to our globe. After surveying the manner in which the motions of his breast were performed in Respir: I was led into a short digression by an enquiry into the more particular nature of those motions & into the manner by which he utter'd Voice & Speech. Having satisfied myself of the exact manner of each of them, I was next led to inquire into the nature of those voluntary motions which

should have been but little above our
Domestic animals in our attainments
knowledge of it. (There can be no doubt but
Speech was originally given by the same
divine power which multiplied languages
at Babel, and which in after ages im-
-parted to the twelve apostles the gift of
languages, and that our great progenitor
spoke one of them as certainly as that he
breathed or walked; for the historian that
relates the one, relates the other. The posterity
of Adam acquired speech and language only
by instruction & imitation, as they have
done the knowledge of a thousand other things.
Our fathers have been to us what the Creator
was to Adam. The only difference in the
manner of our learning to speak is, we
require 18 months, or two years to learn

lay beyond the reach of the eye sight, particularly into the motion of the heart ~~— Teal here — if said they~~ of which he spoke frequently in describing Respiration. — Teal here said he —— upon this, I imagined he placed my hand on his breast. — Beneath it, I felt a strong pulsation. — This said he is the heart. ~~I was It has~~ ~~beat in this manner~~ It has beat in this manner for near 5000 times in an hour 30 years without one moments repose, — It is in one respect the fountain of life — ~~a fons life of mysteries~~ — all the functions of the body depend more or less upon it. — It moves the brain, and is again moved by it — It furnishes the fluid from which all the secretions

to speak perfectly, Whereas Adam was
Divinely
taught to speak perfectly in a few hours,
or perhaps in an instant.

Having described the function
& uses of Respiration, more especially
its application to Voice
& Speech, we proceed next to treat of
the next effect of the inflation of the lungs, that
is the circulation of the blood. And
here I shall first inquire into = p. 216

of the body are obtained, — in short its presence, and action are essential to ~~animal~~ life, ~~in the~~ not only in the human but in most of the animals in the world. The prickly Hydra & one or two animals are the only exceptions to this Observation. — ~~But what is the Structure of their hearts~~ — In delivering the rest of the information derived in ~~inspiration~~ in this way I shall, ~~first in the consideration of the heart~~ ~~dismiss into~~ the course of the blood after it passes thro' the lungs where we left it in treating upon Respiration. 2dly I shall ~~describe~~ ~~dismiss into~~ some peculiarities in the Structure of the heart & blood Vessels. &c 3dly I shall inquire into

the powers which move the blood, and
4ly mention the advantages which are
derived to the system from this impor-
tant function in the animal Oeconomy.

1st. The blood after paſsing thro' the
pulmonary arteries is received by the
pulmonary veins, by which it is
conveyed into the left auricle of the
heart – from whence it paſses into the
left ventricle thro' which it paſses
into the Aorta, which conveys it by
numerous branches into every part
of the body. The blood thus distributed
thro' the body, ~~immediately~~ whether
discharged ~~into~~ immediately into com-
-ijuous & connected veins – or into

glands for the purpose of Secretion - or into excrementous substances, or the corpora cavernosa penis - or into Serous Vessels, is all conveyed into the veins which meet in the Vena Cava this which it is passed into the right Auricle of the heart, from whence it is emptied into the right ventricle of the heart from which I said formerly it was thrown into the lungs in Respiration.

It is remarkable that the Auricles & Ventricles of the heart are perfectly synchronous - that is, both Auricles contract, and both Ventricles expand at the same time. The expansion of the heart is called its Diastole - its

contraction is Systole. It is computed ℥ Zij of blood are discharged from the heart ~~by~~ in every contraction. The valves - which prevent the reflux of the blood into the ~~ves~~ Auricles & Ventricles of the heart will be accurately demonstrated & explained by the Professor of Anatomy.

- That part of the blood which is exhaled in a contant flow from ~~the~~ into certain cavities and ~~on~~ upon most of the external Surfaces of the body, ~~is~~ and ~~also~~ which is not ~~absorbed~~ taken up by the Veins, is absorbed by a second System of vessels called Lymphatics. These ~~absorbs~~ serve a variety of useful purposes to be explained hereafter, but one of them is evidently to act as

it were, the part of an hand maid to the veins, to pick up the fluids which were too numerous - too weighty - or too much diffused, to be absorbed or carried by them to the heart. After collecting this fluid from any part of the body, the Lymphatics pour it with the Chyle into the left subclavian Vein from whence it is carried to the heart, and after having performed its journey home by a different route) it enters with its kindred blood into the heart. —

2 I come now to mention some peculiarities in the structure of the heart & blood vessels which favour the circulation of the blood in the manner

~~that has been described.~~

That the course of the blood I have described in the true one, I infer from the following facts & experiments.

1 From the effects of hæmorrhages &c. which discharge blood alike from every part of the body.

2 From the situation, structure, and functions of the Valves of the heart, which admit of the blood's passage only in one direction.

3 From the effects of Ligatures which cause the veins to swell below, & the arteries above the place where they are applied.

4 From the structure of the Valves of the veins which likewise admit of the blood's passage only in one direction.

5 From the Connexion & Continuation of Arteries and Veins being demonstrated by injections and microscopical Observations.

6 From the effects of tying a Vein in a living Animal near the Cava, or from tying one of the pulmonary Veins. The part which is most remote from the heart in either of these exp. always swells, while that part which is nearest the heart becomes flaccid. If a corresponding artery be tied at the same time with the Veins, the Veins become empty, nor do they fill again Untill the ligature is removed from the Artery.

7 Lastly From the effects of transfusions

in which the blood ~~passes backwards~~ is conveyed from the arteries of one animal into the veins of another animal previously exhausted of its blood, by which means the blood vessels of the exhausted animal are completely filled, and the circulation carried on thro them with vigor & regularity.

II I come now to mention some peculiarities of the heart, & in the structure & course of the blood vessels which favour the circulation of the blood in the manner that has been described.

1 The position of the heart in the thorax where it is fenced by a bony case on every side greatly favours its free & constant action.

V 5 It is the reddist muscle in the body in man & all animals that have red blood.

6 12
~~V~~ It beats near 5,000 strokes in an hour, and during the longest life, knows no intervals of rest. It moves the brain, & is again moved by it. It [redacted] is chiefly instrumental in conveying [redacted] that fluid to every part of the body from which all the Secretions are Obtained. Its presence & its action are necessary to life, not only in men, but in most other animals. The prickly Hydra, and one or two more animals are the only exceptions to this Observation. [redacted]

7 The size of the heart is generally in proportion to

2 Its internal covering called Pericardium favours (from the vapor or
while its ~~produces~~ water which it constantly contains)
the more easy action of the heart,
serves to defend it from the compression
of effused fluids in the thorax. —

3 The Cardiac nerves are accom-
panied by the a coronary Artery which supplies
the heart with blood. How this Artery
serves to give a more exquisite degree
of ~~sensibility~~ Irritability to the nerves of the heart by keeping
up their tension.

4 The heart is evidently a hollow
muscle, with some ligamentous parts, but
possessed of all the properties
of muscular fibres in every other
part of the body. —

~~5 From this structure of the heart, it~~

the strength of an Animal. two
8 It possesses two auricles and ventricles in the human Species and in all animals that breath[e] like him. In the whale, and in amphibious Animals it has two auricles & one ventricle. It has one Ventricle and auricle in fish. It has but a single cavity in the testacea & in Insects. It identifies itself with a kind of Arterial canal in worms & some insects & it disappears in the polypus & certain Zoophytes.

V It is remarkable that the right Ventricle continues to beat longer by several strokes in a dying Animal than the left.

10 by It's cavity is more irritable than its external surface. In frogs turtles & several other Animals it retains its powers of being acted upon a day or two after death. Its sensibility is by no means equal to its irritability. Even when or inflamed, that is felt is diseased the pain is dull. It is rather Anxiety, than pain. See Harvey p 285. VI

It has been found that the

Many experiments prove that it possess an exquisite degree of stimulability; and in a dying person, or even in a person lately dead, the heart may be excited into action by the stimulus of water or air injected or inflated into it, or by heat, certain Vapors, or a Spark of Electricity. It is certainly the most irritable muscle in the body:

Of the Arteries

The following peculiarities with respect to the Arteries deserve our notice, and

1 Their coats - The external is cellular - the internal is a fine polished substance intended probably as a covering

VI

~~The blood, &c.~~ Its want of sensibility in a healthy state ~~is~~ has been proved by ~~experiments~~ Dr Harvey by many facts particularly by the history of a young nobleman who when a boy fractured his ribs on his left side. A suppuration ensued which produced an opening through the membrane that exposed the motion of the heart. Dr Harvey pressed this

membrane of the heart with it, but without giving the least pain. He conducted his patient to King Charles who [illegible] did the same thing, and with a similar issue to the eye.

heart is more irritable in young animals than in such as are full grown: the influence of the will & habits from habit, as was supposed by Dr Berkley.

11 To all these facts I shall add one more communicated to me by Dr Alex^r Ramsay an eminent Anatomist from Edinburgh in the District of Maine. He says he has uniformly found the left Ventricle of the heart larger in all the Americans he had dissected than in Europeans.

to the Middle which is more obviously a muscular Coat of the Artery. This coat is of so compact a nature, and so much more like a membrane or an Expansion of tendon, that Dr Haller & Dr Wm Hunter have both denied that it possess that Stimulability which belongs to muscular fibre in other parts of the body. This Question shall be controverted in its proper place. In the mean while I shall only add, that I shall maintain an opinion contrary to both those Physiologists, & perhaps I may prove that Dr Haller in Spite of his objections to it, has indirectly assented to it. —

✓ This simple Elasticity is greater near the heart, where it is most necessary than in their extremities. ~~[illegible]~~

~~[illegible]~~ Dr. Hunter supposes the ∴ Seat of Elastic power is in the external, & — of the muscular power in the internal ~~[illegible]~~ coat of the Artery.

≠ The heart and the Arteries are synchronous in their pulsations — that is they are felt at the same instant. ~~[illegible]~~ contraction = ion ~~[illegible]~~ forms the pulse of the heart — dilatation forms the pulse of the Artery.

2 All the Arteries have veines and blood vessels - their blood vessels are called Vasa Vasorum. They come from neighbouring Arteries & not from the themselves. They are likewise distributed with Lymphatics.

3 The Arteries possess great mechanical elasticity. This is evident from the pressure which a small peice of the artery of a Dead Animal makes upon the finger. This simple Elasticity is greater in a Dead Animal than in a living one - owing to the diastole of the heart acting upon it, in the living state. It is this distention of the arteries by means of each diastole of the heart that constitutes the Pulse. It is common to all the Arteries, but imperceptible in the smaller ones, except in cases of inflammation.